

Baglan Way Industrial Unit Outline Drainage Strategy

Version 3

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Contract

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Purpose

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Abbreviations

AOD	Above Ordnance Datum
Bgl	Below ground level
BGS	British Geological Survey
ESP	Earth Science Partnership
FCA	Flood Consequences Assessment
Ha	Hectare
JBA	Jeremy Benn Associates
LTS	Long Term Storage
NRW	Natural Resources Wales
RWH	Rainwater Harvesting
SAB	SUDS Approving Body
SUDS	Sustainable Drainage Systems
SWDS	Surface Water Drainage Strategy
TSS	Total Suspended Solids

1 Introduction

1.1 Terms of Reference

JBA Consulting was commissioned by CJ Construction Ltd in June 2021 to prepare an outline surface water drainage strategy for a proposed industrial development at Baglan Way, Port Talbot.

1.2 Site description

The proposed development site is located along Baglan Way, within the Baglan industrial estate, in the north-west of Port Talbot, South Wales, as shown in Figure 1-1. The site is approximately 11.94ha in size and is currently an undeveloped brownfield site. The north and west of the site is bound by Moor Road, and the south by existing industrial development. The east of the site boundary is adjacent to Baglan Way, which provides an existing access route for the site. Further site details are contained in Table 1-1.

The proposal is predominantly to develop the eastern area of the site, retaining the natural landscape on the western side.

Table 1-1 Summary of site details

Site name	Baglan Way
Site area	11.94ha
Existing land use	Brownfield
Proposal	Industrial development
OS NGR	SS 74914 914493
Lead Local Flood Authority	Neath Port Talbot County Borough Council
Sewerage Undertaker	Dŵr Cymru Welsh Water

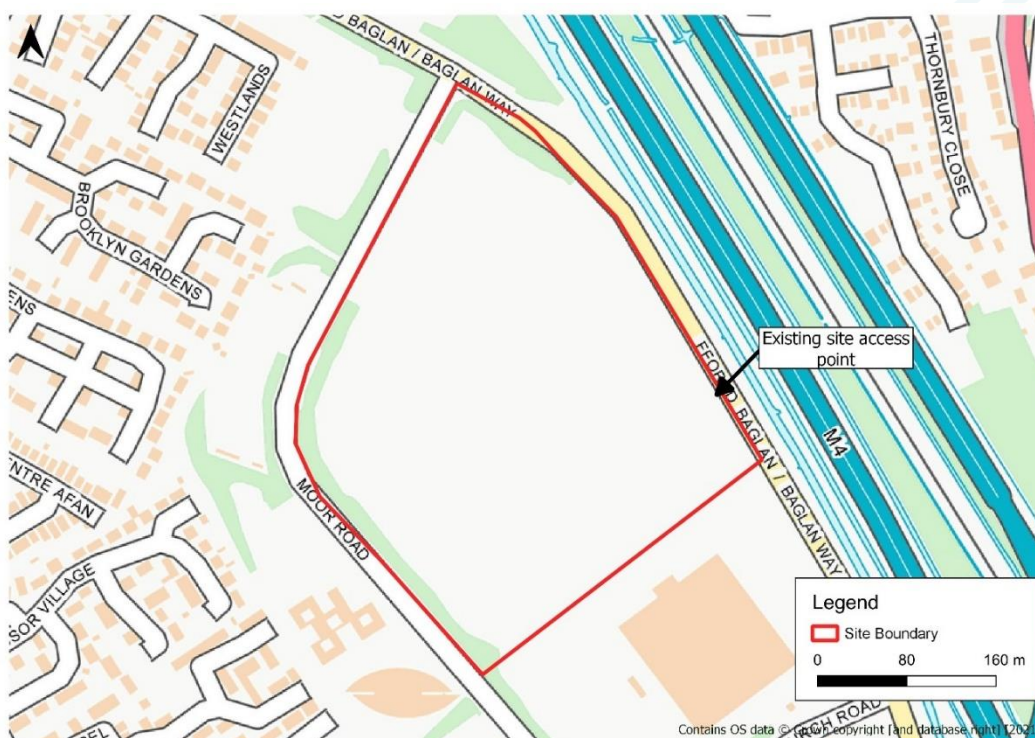


Figure 1-1 Proposed development site

1.3 Site Topography

John Vincent Surveys Ltd undertook a topographic survey in February 2021 to determine the current site levels. A copy of the survey results is contained in Appendix A. Figure 1-2 shows the Natural Resources Wales' (NRW) Open Source 1m Light Detection and Ranging (LiDAR) data which provides an alternative illustration of the site topography.

The topographical survey shows that the site generally slopes down from the south western corner to the east of the site. Ground levels are highest in the south west, ranging between 6mAOD and 6.5mAOD. A small, raised area is present in the centre of the site at 6.68mAOD, suggesting that land raising has been completed as part of previous development. The south east area of the site displays an area of lower elevation which ranges between 5.2mAOD to 5.3mAOD.

As a result of this topography, the site naturally drains towards the south-eastern boundary along Baglan Way, which lies adjacent to Baglan Brook.

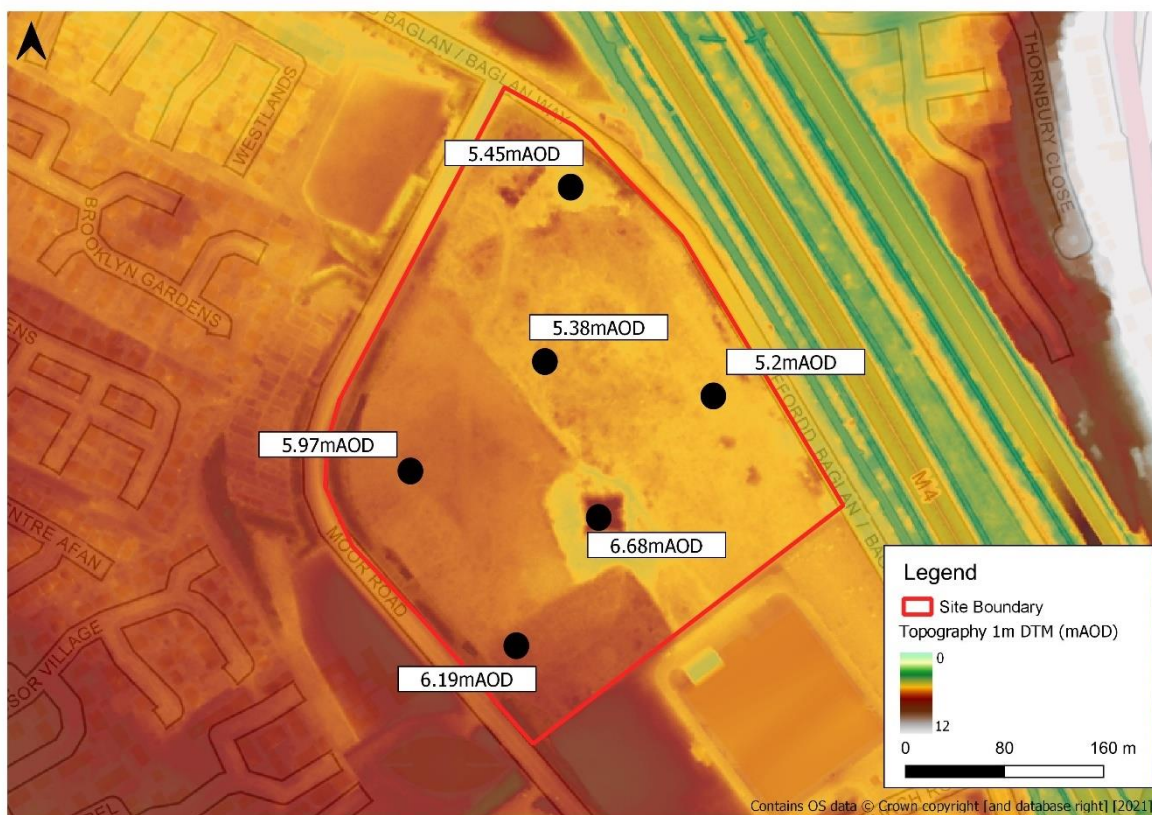


Figure 1-2 LiDAR topographic data from NRW (1m resolution)

1.4 Historic Land-Use and Drainage Infrastructure

Baglan Brook is located to the east of the site, as shown in Figure 1-3, which has the potential to be used as an existing outlet for surface water. The Welsh Water Seaway Parade Pumping Station is located 270m to the north of the site. Its operation is key to the drainage of the Baglan Brook during all conditions.

The River Afan is located 1.8km to the southeast of the site, and the River Neath is located 2.3km to the northwest of the site. Both watercourses flow in a south-westerly direction and are tributaries to the Severn Estuary. The site is located 1.5km from the South Wales coastline.

Due to the existing residential and industrial surroundings of the site, it is likely that there is a drainage network present within proximity to the site, although this is unknown and will require further investigation.

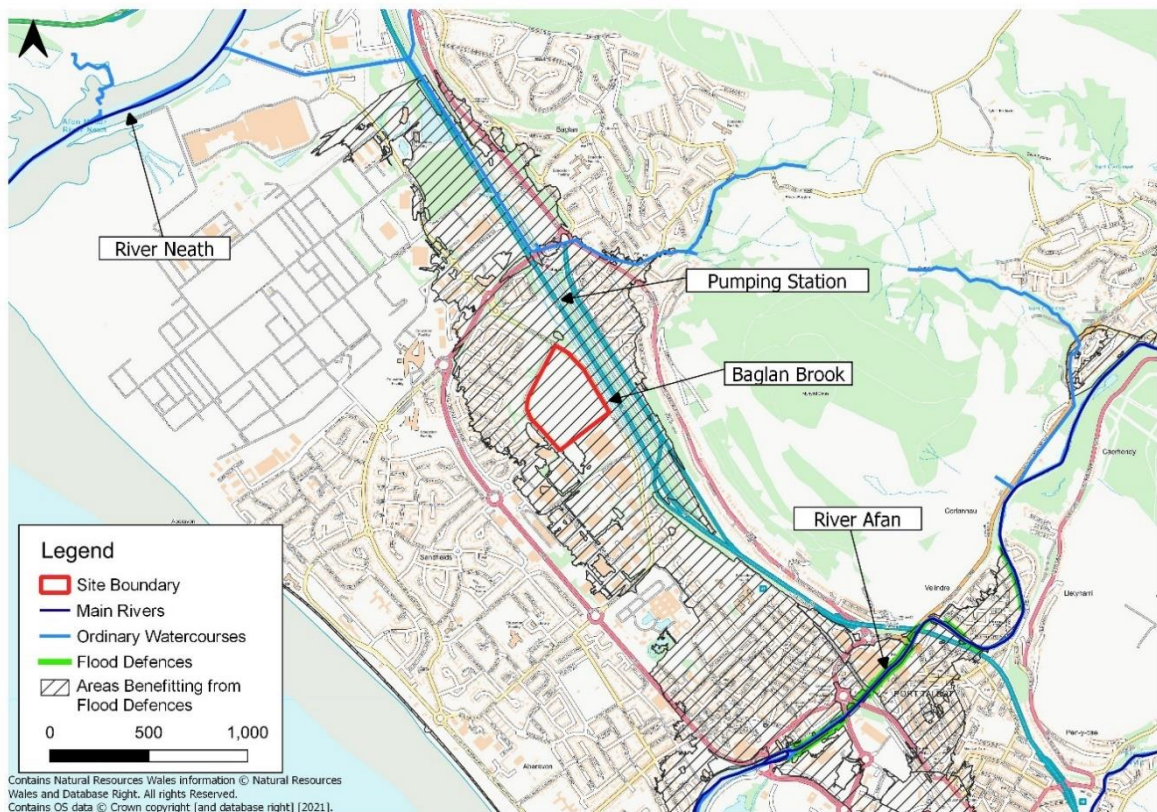


Figure 1-3 Nearby watercourses

1.5 Site geology and hydrogeology

The British Geological Society (BGS) Geology of Britain viewer¹ indicates that the proposed development site is underlain by South Wales Lower Coal Measures Formation, comprised of mudstone, siltstone, and sandstone. There are superficial deposits beneath the site in the form of Tidal Flat Deposits, comprised of clay, silt, and sand.

The Cranfield University Soilscape viewer² describes the local soil as loamy and clayey soils of coastal flats with naturally high groundwater. Further ground investigation planned during the detailed design stage will determine the water table level and its potential impacts on the SuDS features.

Local borehole records also indicate that the area is comprised of clayey material. Natural infiltration is unlikely, therefore, to occur to take large volumes of surface water off the site.

The BGS borehole records show a number of historical cores located in close proximity to the site, along Baglan Way. Groundwater was encountered predominantly at depths of between 10-30m (average approximately 25m), with a couple of scans recording groundwater depths of 33m to the north of the site boundary, all collected in the late 1970s.

1.6 Proposed development

The proposal is for an industrial development comprising of the construction of a warehouse with the purpose of glass manufacturing in the eastern vicinity of the site, as shown in Figure 1-4. The development area is approximately half of the site (5.5ha). To the north and east of the building will be areas designated to car parking, and to the south will be a loading bay. The proposal identifies that the western area of the site is to be left undeveloped and remain

¹ British Geological Society. Geology of Britain viewer <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

² Cranfield University Soilscape viewer <http://www.landis.org.uk/soilscales/>

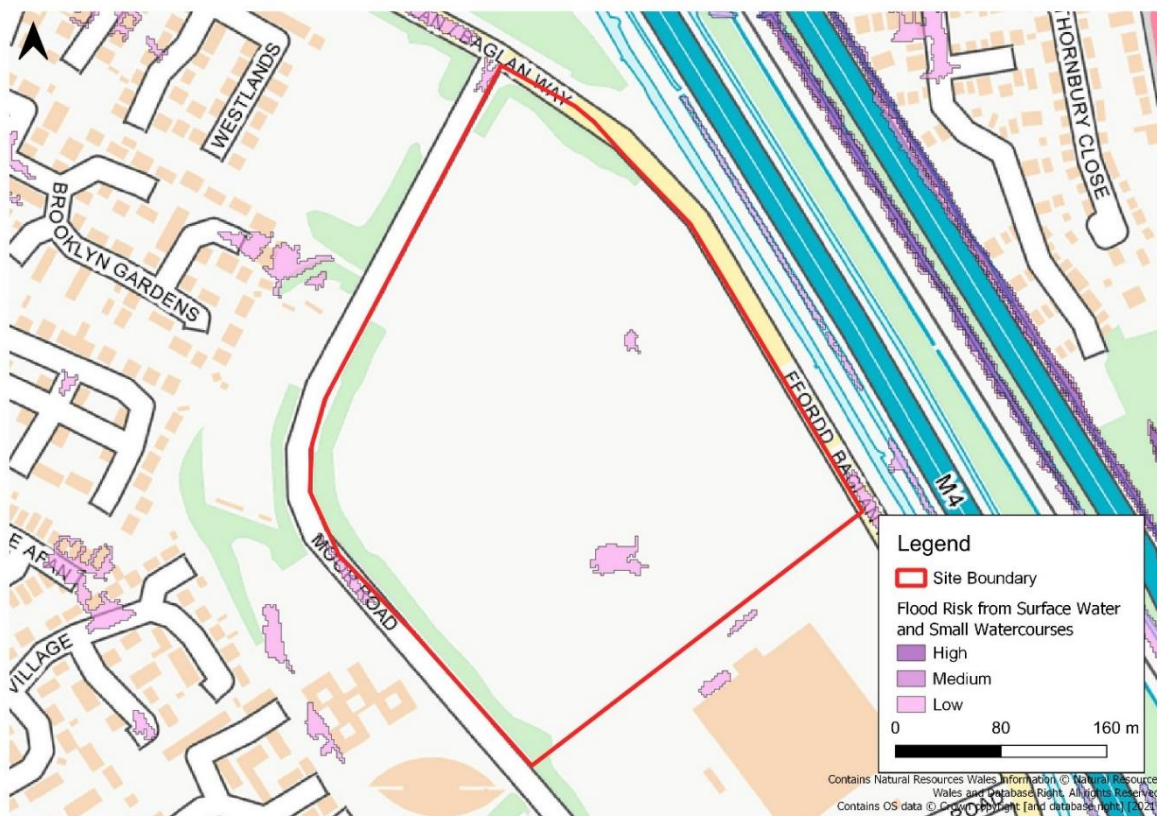


Figure 1-5 FRAW - Flood risk from surface water and small watercourses

2 Surface Water Drainage Strategy

2.1 Existing Surface Water Regime

The site's surface water catchment is singular with the downstream extent in the south eastern vicinity as shown in the flow path map in Figure 2-1. The natural flow path is to the east towards Baglan Way. Surface water would enter Baglan Brook, in the direction of land to the east of the site.

A Geotechnical and Geoenvironmental Report was prepared by Terra Firma in August 2021. This report details the result of three soakaway tests undertaken on the site in general accordance with BRE 365:2016. Two of the trial pits, located at the north-eastern corner and south-western corner had negligible infiltration rates, whilst the third, located at the centre of the site produced a rate in the region of 10^{-5} . As a result, it is considered that there are variable infiltration rates across the site, and it is advisable that further testing is undertaken.

Given the varied potential for infiltration, and an underlying soil/bedrock of made ground comprising of sand and gravel underlain by superficial deposits of silty clay, peat or silty sand, underlain by weathered coal measures, it is considered that surface water generally drains via overland flow paths to the south-western corner of the site. The LiDAR data and the topographic survey has been used to determine ground levels across the site, with indicative flow routes shown in Figure 2-1.

Groundwater was encountered beneath the site at various depths of 1.9 to 16.1m below ground level.

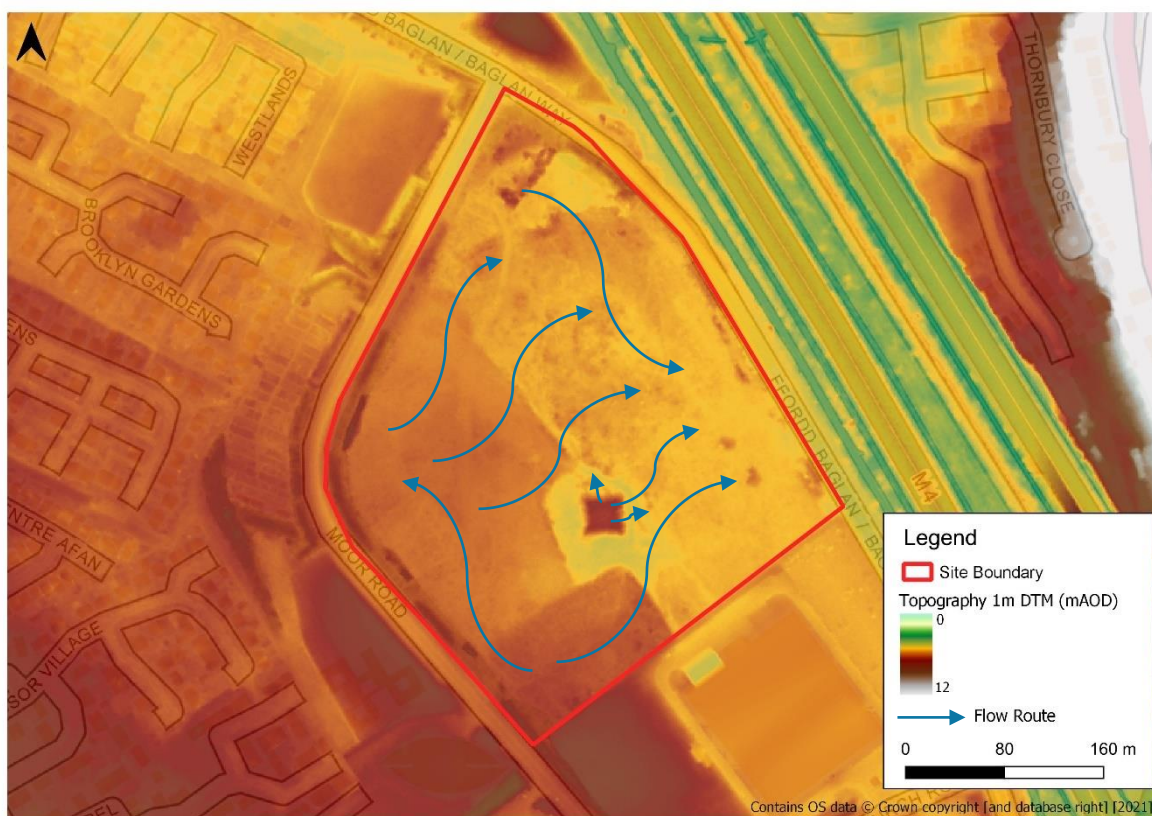


Figure 2-1 Indicative Surface Water flow paths

2.2 Greenfield Runoff Rates

Table 24.1 of Ciria C753 The SuDS Manual indicates that FEH methods (FEH Statistical and ReFH2) should be the preferred methods for calculating peak Greenfield runoff rates. This is supported by Natural Resources Wales GN008: Flood Estimation: Technical Guidance and

Environment Agency research by Faulkner et al which concluded that FEH methods are applicable across a range of catchment sizes and that they should be used in place of outdated methods such as IH124 and ADAS 345 where possible.

The UKSUDS Tool was used to calculate Greenfield runoff rates for the developable area of the site. The developable area is 5.54ha. Catchment descriptors (SAAR and BFI Host) were extracted from the FEH web service. The calculated Greenfield runoff rates are shown in Table 2-1 below and the UKSuDS calculation record is found in Appendix B.

Table 2-1 Greenfield Runoff Rates

Return Period	Specific Runoff (l/s/ha)	Peak Runoff Rate (l/s)
1	4.2	23.27
QBAR	4.77	26.45
30	8.49	47.08
100	11.74	57.66

2.3 Greenfield Runoff Volumes

Runoff volumes for the whole site area were also calculated for a six-hour storm event at the site using the FSSR16 method as shown in Equation 1 below.

Equation 1:

$$\text{Runoff Volume} = \text{Site Area} \times \text{Rainfall Depth} \times \text{Percentage Runoff}$$

The rainfall depths for a six-hour 100-year storm event were extracted from the FEH web service and are summarised in Table 2-2 with the calculated Greenfield Runoff Volumes

Table 2-2 Greenfield Runoff Volumes

Return Period	6-hour rainfall runoff depth (mm)	Site Runoff Volume (m ³)	Specific Volume (m ³ /ha)
30	48	577	104
100	59	754	136

3 Surface Water Management Approach

3.1 Surface Water Drainage Proposal

An outline surface water drainage proposal for the site has been developed which will aim to control surface water runoff without increasing flood risk to other developments or impacting on water quality downstream. The development of the drainage strategy is via a number of steps where the drainage objectives and options for SuDS features are determined. Further detailed design of the drainage scheme will be determined once an agreement in principle has been received from the SuDS Approval Body (SAB).

This outline strategy discusses each SuDS standard in turn and details the way in which the proposed surface water drainage strategy will comply with each standard.

3.2 Sustainable Drainage Systems

Sustainable Drainage Systems (SuDS) aim to mimic the natural processes of surface water drainage by allowing water to flow along natural flow routes ensuring that runoff rates and volumes during storm events are not increased above the Greenfield values. In this instance, a target betterment of 30% as stated in the guidance for previously developed land was comparable to the Greenfield target. SuDS also aim to provide water treatment, biodiversity and amenity benefits within Blue and Green corridors.

Schedule 3 of the Flood and Water Management Act 2010 was enacted in Wales in January 2019, leading to the requirements for all new developments to incorporate the four pillars of SuDS design, shown in Figure 3-1.

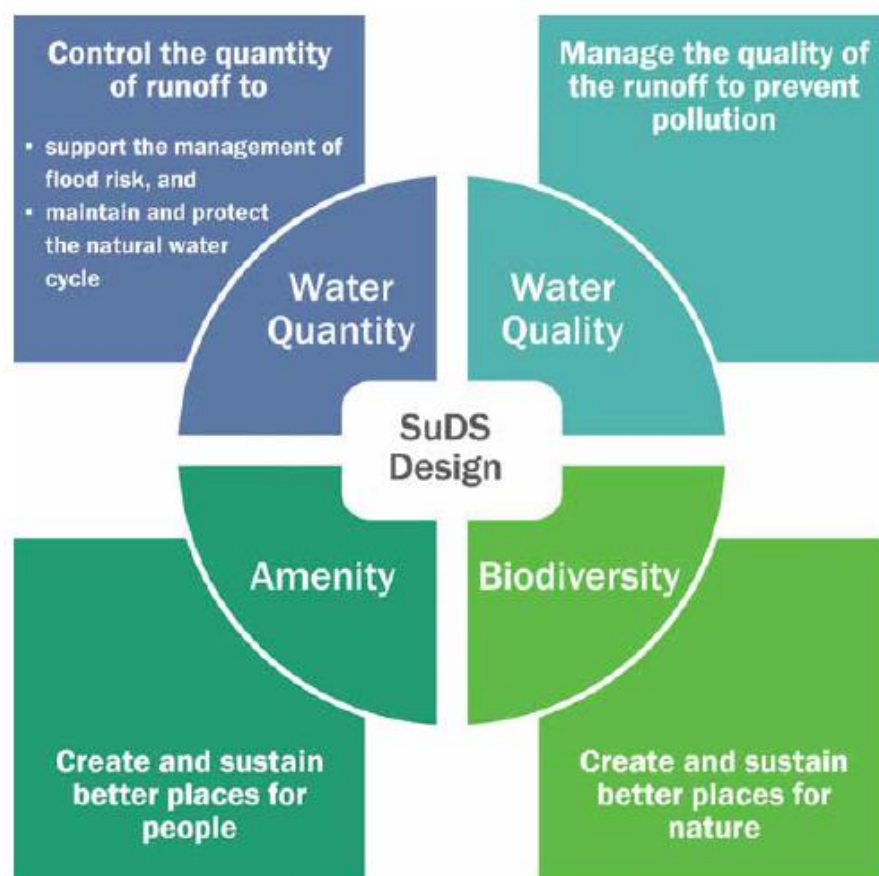


Figure 3-1 The Four Pillars of SuDS Design (Ciria SuDS Manual)

3.2.1 Design Criteria

A drainage strategy outlining the means of surface water management at the proposed development has been produced in line with the latest guidance and design standards including:

- C753 "The SuDS Manual" (CIRIA, 2015)
- Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems (Welsh Government, 2018)
- Rainfall Runoff Management for Developments – SC030219 (Environment Agency, 2013)
- Planning Policy Wales (Edition 9, November 2016)
- The Building Regulations 2010: Part H: Drainage and Waste Disposal

Where surface water is managed through piped systems, they should be designed for 1-year/2-year storm 'in-pipe' flow and to ensure no surface water flooding during a 30-year storm event.

In line with Sustainable Drainage Systems Standards for Wales (2018), surface water runoff events up to the 1% AEP (1 in 100 year) return period event should be managed to protect people and property on and adjacent to the site from flooding from the drainage system.

The Welsh SuDS Standards state that attenuation storage should be utilised to limit discharge of runoff from the site with surface storage features used in preference to underground systems as they are considered more adaptable.

Neath Port Talbot County Borough Council do not currently have specific local guidance for SuDS. Should guidance be available at detailed design stage, it should be also be consulted to inform the drainage strategy.

3.3 S1: Surface Water Runoff Destination

The statutory standards for SuDS in Wales address the use of surface water by the development and where it should be discharged. Standard S1 describes a destination hierarchy which sets out the preferred routes for discharge of runoff from the site:

- Priority Level 1: surface water runoff is collected for reuse
- Priority Level 2: surface water runoff is infiltrated to ground
- Priority Level 3: surface water runoff is discharged to a surface water body
- Priority Level 4: surface water runoff is discharged to a surface water sewer, highway drain or other drainage system
- Priority Level 5: surface water runoff is discharged to the combined sewer

Priority Level 1 is the preferred (highest) priority and 4 and 5 should only be used in exceptional circumstances. The following outlines how the proposed development adheres to the drainage hierarchy.

Priority Level 1 – water for re-use

It is envisaged that the yield: use ratio will be sufficient to enable the surface water runoff to be partially managed by rainwater harvesting. It has been proposed that rainwater which lands on the roof of the administration office will be collected with an attenuation and rainwater harvesting system, allowing the potable water to be re-used within the toilet facilities within the proposed development.

Surface water from other areas of the site (i.e. car parks and the remaining roof area) shall be managed through other priority levels.

Priority Level 2 – infiltration

The Geotechnical and Geoenvironmental Report produced by Terra Firma in August 2021 details the results of three soakaway tests conducted across the site. Two of these tests (located in TP01 and TP03) were undertaken outside of the developable area of the site. 1 test (TP04) was carried out within the developable area of the site, in the south-eastern corner. Tests demonstrated variable infiltration potential across the site from no infiltration to rates in the region of 10^{-5} . The trial pit demonstrating favourable infiltration rates was located outside of the proposed developable area.

Additionally, 4-5 boreholes on the site recorded groundwater 1.3-1.4m below ground level, and a desktop study indicates that boreholes along the M4 corridor also recorded shallow groundwater depths. With this depth to groundwater, it would not be possible to have the required 1m depth between the base of the asset and groundwater to allow for infiltration of surface water across the site.

On this basis, infiltration has been discounted on the site. This approach has been confirmed by the SAB, with the confirmation contained in Appendix XX.

Priority Level 3 – discharge to surface water body

Baglan Brook lies to the east of the site alongside Baglan Way. It is therefore proposed to discharge of surface water from areas of hardstanding and the warehouse roof (with the exception of the administration office roof) to the Baglan Brook. There are three known outfalls from the highway drainage system of Baglan Way into the Baglan Brook (contained in Appendix XX). It is therefore proposed to utilise these outfalls to discharge of surface water from the development site. Further information is required on the depth and condition of the system to facilitate a connection at detailed design stage.

As a suitable discharge location has been found, Priority Levels 4 and 5 do not need to be considered further.

3.4 S2: Surface Water Runoff Hydraulic Control: Proposed Discharge Rate

Peak rate of runoff can be readily managed and reduced using flow control and attenuation techniques. The reduction of runoff volume can however be more difficult to achieve as it relies upon infiltration, evapotranspiration and re-use. Where these SuDS techniques are not viable then the alternative is to provide an appropriate attenuation in overground (e.g. detention basins, retention ponds, swales) storage facilities by further restricting peak rates of runoff.

To mitigate against increasing downstream flooding due to the additional volume of runoff, alternative approaches should be considered as follows:

- Segregation of Long-Term Storage Volume (LTS), the difference between the pre- and post-development runoff volumes from the main peak flow attenuation. The LTS is then discharged at very low rates (less than 2l/s/ha) and the remaining peak flow attenuation can be discharged at equivalent greenfield runoff rates with suitable deductions made for the discharge from the LTS. In practice, this arrangement is quite complex and depends on catchment size, site layout, topography, viable runoff disposal options and the number of outfalls.
- Restricting discharges for all return period storms up to the 100-year plus climate change storm event to the pre-development QBAR flow rate or reduced existing greenfield flow rate. Effectively, surface water is managed collectively and discharged at low rates to extend the runoff hydrograph from the site.

The second approach has been adopted for the purpose of this study.

The site is brownfield and derelict in nature. Greenfield runoff rates and volumes for the whole of the site have been calculated with the outline drainage strategy designed to attenuate flows to these levels.

There are typically three design storm events which should be considered when designing the SuDS system and managing flows and volumes:

- 1 in 1 year event, on sloping sites without basements, where surcharging above soffits of any surface water drainage pipework is not permitted.
- 1 in 30-year storm event, where surface water flooding of the site does not occur at this frequency
- 1 in 100-year storm event with allowances for future climate change, where runoff from the site should be controlled to the Greenfield rate using SuDS attenuation features to manage flows and volumes within the extents of the development site.

3.4.1 Interception of Rainfall

When rainfall takes place on greenfield sites there is, for the majority of rainfall events, no runoff due to evapotranspiration or groundwater recharge. Therefore, interception mechanisms are based on runoff volume reduction using evapotranspiration and infiltration processes. Table G2.1 of the statutory standards for SuDS in Wales lists the interception drainage components which have assumed compliance. Rainwater harvesting systems proposed for use on the development site, are deemed compliant as interception mechanisms. The methods by which the 5mm interception requirement is met for the entirety of the site in accordance with Table G2.1 of the Statutory Standards for SUDS will be provided as part of a full application. Preliminary calculations at outline design indicate that should the proposed SuDS assets remain unlined, the system serving the ancillary areas will be considered to comply with the requirements for interception. However, interception cannot be achieved for the system serving the warehouse roof as a result of space constraint on the site. Every effort has been made to provide an above ground SuDS system which meets the requirements of the statutory standards for SuDS in Wales, with all landscaped areas of the site forming a part of the SuDS system. Further guidance is therefore sought from the SAB with regards to the interception requirements for the warehouse roof system.

3.4.2 Attenuation Storage

Runoff Rates have been calculated for the roof and ancillary areas (5.54ha) and are presented in Table 3-1.

Table 3-1 Proposed Discharge Rates

Area	Plan Area (Ha)	Greenfield QBar (l/s/ha)	Proposed Discharge Rate (l/s)
Administration office Roof Area	0.13	4.77	0.62
Warehouse roof Area to Tank 1	0.77	4.77	3.67

Warehouse roof Area to Tank 2	0.99	4.77	4.72
Warehouse roof Area to Tank 3	0.54	4.77	2.58
Ancillary Areas	1.83	4.77	9.3 l/s

The UKSUDS Tool has been used to calculate the required storage volume for the proposed development for the 1 in 100-year event plus 40% to account for climate change. The site has been split into catchments, dependent on the end discharge location for each area.

It is proposed to drain the Administration office roof of the industrial unit to a rainwater harvesting system. It is proposed to utilise an active attenuation system to store surface water on site for re-use. This attenuation requirement for rainwater harvesting is calculated based on average rainfall events across the year. However, this volume would be exceeded during extreme rainfall events. Therefore, the UKSuDS tool has been used to determine the volume of attenuation required for the 1 in 100 yr + Climate change event. This has been calculated as 54m³.

The remaining area of the roof which is situated above the warehouse will not re-use water that lands on it; therefore water will be conveyed across the site via rain gardens and attenuated in a tank before being discharged into Baglan Brook at a controlled flow rate. The UKSuDS tool has been used to determine the volume of attenuation required for the 1 in 100 yr + Climate change event. This has been calculated as 1870m³.

For the remaining areas of the site (i.e. hardstanding area), the UKSuDS Tool has been utilised to determine the attenuation storage required. This has been based on a site area of 3.1ha (developable area of 5.54ha minus the roof area). The impermeable area is 1.83ha. SAAR and BFI have been edited from the default values based on the catchment characteristics taken from the FEH web service. The required storage volume across the hardstanding areas of the site (all areas except the roof) for the 1 in 100-year plus climate change event has been calculated as 1488m³. The UKSUDS tool calculation record can be seen in Appendix C.

3.4.3 Exceedance Events

Extreme events exceeding the design event could occur and result in overland flows across the site. The duration of flooding, maximum depths, velocity and route of flood flows should be established and managed. The impact of exceedance flows onto adjacent land should also be considered – the return period of this assessment will be related to the potential consequences associated with the impact, and further guidance is requested from the SAB.

For the proposed development site, it is envisaged that flows generated by exceedance events shall be managed via proposed swales and basins to the east of the site, with surface water draining in a controlled manner to the adjacent watercourse.

3.4.4 Climate change impact

A climate change allowance of 40% has been used in line with the upper estimates for the 75-year design life of the development.

3.5 S3: Water Quality

To mitigate against adverse impacts on the water quality of the receiving water environment the CIRIA SUDS Manual recommends the following steps to determine the required water quality management for discharges to surface waters and groundwaters:

- Plan land use to prevent runoff and associated pollutants for most rainfall events up to 5mm in depth.
- Identify the pollution hazard level associated with the given type of development.
- Select risk assessment approach based on receiving water environment and the pollution hazard level.
- Carry out the risk assessment for each outfall considering the pollution hazard level, the status of the receiving water environment and effectiveness of the proposed SUDS techniques.

Table 4.3 of the SuDS Manual advocates the use of the "simple index approach" to determine an appropriate level of pollution mitigation for such sites. This splits pollution into three contaminant types (Total Suspended Solids, Metals and Hydrocarbons) and assigns a "pollution hazard index" to each type. Different SuDS features are then assigned a "SuDS Mitigation Index" and sufficient treatment is deemed to be provided if the "SuDS Mitigation Index" is equal to or greater than the "pollution hazard index" for each pollutant type. When more than one SuDS component is required a multiplication factor of 0.5 is applied to mitigation indices for secondary and tertiary components to account for reduced performance.

The proposed uses at the site will comprise industrial unit roof and car parking, including a loading bay. The proposed strategy utilises three separate systems and therefore shall be assessed appropriately. Roof water from the administration office shall be re-used through rainwater harvesting and therefore does not need to be considered further. The Ancillary areas and warehouse roof systems have been considered separately below.

System 1 – Ancillary Areas

Parking is classified as 'medium' pollution hazard level in Table G3.1 of the Statutory Standards for sustainable drainage systems in Wales 'Medium' hazard pollution level requires application of a 'simple index approach' for water quality risk assessment for discharge to surface waters.

The "pollution hazard indices" for a medium pollution hazard site are given in Table 3-2 below.

Table 3-2 Pollution Hazard Indices for a Medium Pollution Hazard Site

Total Suspended Solids (TSS)	Metals	Hydrocarbons
0.7	0.6	0.7

Table 3-3 provides the indicative SuDS mitigation indices for the proposed SuDS features for the site. It demonstrates that the mitigation indices for the proposed SuDS assets are greater

than or equal to the “pollution hazard index” for each pollutant type. Therefore, the strategy is deemed to comply with the water quality requirements of the SuDS standards.

Table 3-3 Indicative SuDS Mitigation Indices

SuDS Component	Mitigation Indices		
	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Rain garden	0.8	0.8	0.8
Permeable paving	0.7	0.6	0.7
Bioretention rill	0.8	0.8	0.8
Pond	0.7	0.7	0.5

System 2 – Roof

The warehouse roof is classed as ‘Low Pollution Hazard’. The pollution hazard indices for a low pollution hazard site are given in Table 3-4 below.

Table 3-4 Pollution Hazard Indices - Low Pollution Hazard Site

Total Suspended Solids (TSS)	Metals	Hydrocarbons
0.3	0.2	0.05

Table 3-5 provides the indicative SuDS mitigation indices for the proposed SuDS features that surface water from the roof shall drain through. It demonstrates that the mitigation indices for the proposed SuDS assets are greater than or equal to the “pollution hazard index” for each pollutant type. Therefore, the strategy is deemed to comply with the water quality requirements of the SuDS standards.

Table 3-5 SuDS Mitigation Indices

SuDS Component	Mitigation Indices		
	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Rain garden	0.8	0.8	0.8

3.6 S4: Amenity Value

The design of the surface water management system should maximise amenity benefits across the site. SuDS components can enhance the provision of high-quality, attractive public space which can help to provide health and well-being benefits, improve liveability or local communities and can contribute to improving the climate resilience of new developments.

The aim of Standard 4 (S4) is to ensure that wherever possible and having regard to the need to prioritise infiltration drainage, the SuDS scheme makes the best contribution towards maximising benefits for amenity. The proposed SuDS scheme utilises rain gardens, ponds and swales which will improve the aesthetics of the site and are known to provide health and wellbeing benefits to users of the site. Additionally, these assets shall improve the climate

resilience of the development. Areas of permeable paving are multifunctional areas providing storage and treatment whilst forming areas of parking across the site.

3.7 S5: Biodiversity

The surface water drainage system should seek to enhance existing habitats within the site and complement neighbouring habitats. The ecological potential of the SuDS system can be maximised by utilising local planting and locating SuDS adjacent to existing features. The strategy should create a range of habitats which should be sustained by ensuring that an effective management regime is implemented.

Vegetated SuDS are proposed for the development site in the form of a rain gardens, ponds and swales. It is proposed that the rain gardens will be vegetated using planting of known wildlife value that are appropriate to the location. Native plants and grasses will be used where possible that are appropriate to the region and suited to local soils and hydrology. The use of invasive species will be avoided.

The detailed design phase of the proposed surface water drainage strategy will provide further information on the proposed ecological enhancements to be provided across the site.

3.8 S6: Design for Construction, Maintenance and Structural Integrity

The national SuDS standards state that components must be designed to ensure structural integrity of the drainage system and any adjacent structures or infrastructure under anticipated loading conditions over the design life of the development, taking into account the requirement for reasonable levels of maintenance. The detailed design phase of the proposed surface water drainage strategy will provide further information on the proposed maintenance of vegetation such as raingardens and maintenance of flow control devices, permeable paving, pipework, filter drains and rills. The detailed design will include a maintenance plan and associated costs for the development site. However, it is envisaged that the maintenance for the majority of the SuDS strategy will be akin to general vegetation maintenance.

Schedule 3 of the Flood and Water Management Act was implemented in Wales on the 7th January 2019. Under this legislation, SuDS must be approved and adopted by the landowner – a function performed by the Lead Local Flood Authority at Neath Port Talbot County Borough Council. However, the proposed development will be retained under one landowner and thus the SuDS will not be adoptable.

3.9 Conceptual Drainage Strategy

The proposed drainage strategy utilises SuDS wherever possible across the development site to manage surface water as close to the surface as possible. A series of assets are proposed to store surface water from footpaths, loading bays and car parks and discharge it at greenfield runoff rates to the Baglan Brook located to the east of the development site. It is proposed to utilise rainwater harvesting, treating rainwater as a valuable natural resource, to manage surface water generated from the administration office roof of the proposed industrial unit. For the remaining area of the industrial roof that will not be utilised through rainwater harvesting, water will be conveyed via rain gardens, providing water quality treatment before the water is attenuated and discharged into Baglan Brook.

The incorporation of SuDS assets across the site will provide the required storage volumes via an active attenuated rainwater harvesting system, permeable paving located within the designated car parking areas, a series of rain gardens, as well as a sequence of detention basins which will be connected via swales along the north-eastern boundary of the site.

As outlined, the rainwater storage system will be designed for attenuation as well as water re-use for the facilities located on site. The rainwater harvesting system proposed for the office roof will be designed to attenuate the 1 in 100-year + CC volumes from the roof of the administration block of the proposed industrial unit thus providing 54m³ of tanked attenuation. A smart control system that monitors the incoming rainfall events and uses level

probes and valves to release water to drain and adjust the level inside the tank when required will be used to ensure sufficient attenuation tank size within the rainwater harvesting system for high rainfall events. The attenuation provided within the rainwater harvesting system is not accounted for within the UK SuDS storage requirement tool and has been calculated separately (Appendix D).

For the remaining area of the roof, rainwater will be conveyed via rain gardens to three attenuation tanks located within the southern loading bay, northern lorry turning area and underneath the eastern area of permeable paving. Similarly to the rainwater harvesting system, the tank will be designed to attenuate the 1 in 100 year + CC volumes, providing 1870m³ of tanked attenuation, in total. Water will be released at a controlled rate from the tank into the surface water body via the existing highway outfall south of the development site.

The additional required attenuation from other areas of hardstanding across the developable area of the site (equivalent to 1.83ha of impermeable area) will be provided in an area of permeable paving within the designated car parking areas (4945m²). The volume of storage provided within the permeable paving is 742m³ assuming a depth of 0.5m. Rain gardens will be utilised around the edge of the warehouse and parking areas, contributing 255m³ of storage volume across the site.

It is proposed that a series of basins connect via a series of swales within the development boundary which will allow for discharge to be directed into Baglan Brook along the eastern boundary of the site. The flat topography of the site is a significant constraint, and further consideration should be given at Detailed Design stage to raise ground levels to facilitate the SuDS scheme or provide a number of outfalls to Baglan Brook to ensure surface water flows via gravity across the site. SuDS assets have been designed to be relatively shallow in nature to facilitate the flat topography across the site. It is proposed that the basins contribute towards 517m³ of storage volume within the site, and the connecting swales add an additional capacity of 75m³. There is a proposed pond in the eastern vicinity of the site which contributes 29m³ of storage volume.

The permeable paving, rain gardens, basins and swales aim to improve water quality, and systems in place will provide a water quality treatment process in line with the Simple Index Approach. The flow from the permeable paving will be piped to the basins or swales, where further water quality benefits will be sought before the final flow control discharging into the Baglan Brook.

The proposed outline drainage strategy is contained in Appendix E.

3.10 Construction stage

The surface water runoff will need to be managed during the construction stage of the development to minimise the risk of flooding and pollution to the surrounding environment. This will be addressed within a Construction Environmental Management Plan prepared for the development by an appointed contractor for the works prior to construction commencing and shall be submitted at detailed design stage.

4 Construction (Design and Management) review

Under the construction (Design and Management) Regulations (CDM 2015) it is the designer's duty to:

- eliminate foreseeable health and safety risks to anyone affected by the project.
- take steps to reduce or control any risks that cannot be eliminated.
- communicate, cooperate and coordinate with the client, other designers and contractors involved in the project so that designs are compatible, and health and safety risks accounted for during the project and beyond.

The following potential significant hazards associated with the future construction and operation of the surface water drainage system have been identified:

- Underground services: public surface and foul water sewers in the eastern part of the site. Potential for private services associated with the pre-development land-use.
- Ground/ groundwater conditions within the site and the known contamination risk.
- Unexploded Ordnance: a regional 'unexploded bomb (UXB) risk map' for Neath Port Talbot has been reviewed through the <https://zeticauxo.com/> website. The map shows that the site has a 'low' UXB risk.
- Work near water: possible connection of the proposed surface water drainage system to the Baglan Brook, maintenance of the drainage system.
- Access / live traffic: access via Baglan Way.
- Existing vegetation located across of the site.

It should be noted that the document identifies only significant hazards and risk within and in the immediate vicinity of the site based on a desk-based assessment of available information. The list therefore should not be considered as exhaustive, and a detailed site/services survey should be undertaken prior to commencing any construction activities on site.

5 Conclusions and recommendations

- JBA Consulting was commissioned by CJ Construction Ltd to prepare an Outline Surface Water Drainage Strategy in a support of a planning application for a proposed industrial development at Baglan Way, Neath Port Talbot.
- The existing site is currently brownfield in nature, however the land has since re-naturalised and is now covered in shrub vegetation. Past building at the site was prior to 2002, and the site has little natural infiltration.
- The proposed development consists of one industrial unit, with an attached office block, car parking, and lorry distribution areas.
- It is proposed that surface water generated from the administration office roof of the proposed industrial unit shall be re-used and attenuated in an active attenuation rainwater harvesting system. It is estimated that 54m³ of storage shall be required for the 1 in 100 year + climate change event.
- Surface water generated on the remaining area of the roof of the proposed industrial unit shall be conveyed via SuDS features (rain gardens) and attenuated in a three storage tanks, as required during storm events. Surface water will then be discharged to the surface water body at a controlled flow rate. It is estimated that 1870m³ of storage shall be required for the 1 in 100 year + climate change event.
- It is proposed that surface water runoff from other hardstanding areas of the proposed development will be discharged to the nearby Baglan Brook at a flow rate no greater than the QBar greenfield equivalent of 4.77l/sha for all events up to and including the 1 in 100 year plus 40% climate change storm event.
- The UKSuDS Tool has been used to indicate that 1488m³ of attenuation storage will be required to limit the discharge to this rate for the ancillary areas. The required attenuation storage will be provided within lined permeable paving within the car park, along with rain gardens and a series of detention basins and wet swales along the eastern boundary of the site.
- The proposed SuDS assets shall provide sufficient water quality and amenity/biodiversity benefits to the site.

Appendices

Appendix A: Topographic Survey

Appendix B: Greenfield Runoff Rates

Appendix C: Estimate Storage Volumes

Appendix D: Rainwater Harvesting Active Attenuation System

Appendix E: Outline Drainage Strategy

Offices at

Coleshill
Doncaster
Dublin
Edinburgh
Exeter
Glasgow
Haywards Heath
Isle of Man
Limerick
Newcastle upon Tyne
Newport
Peterborough
Saltaire
Skipton
Tadcaster
Thirsk
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